

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted during the academic year 2011 – 12 & thereafter)

SUBJECT CODE : 11MT/PE/OR34

M. Sc. DEGREE EXAMINATION, NOVEMBER 2014
BRANCH I - MATHEMATICS
THIRD SEMESTER

COURSE : ELECTIVE
PAPER : OPERATIONS RESEARCH
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A **(5 X 2 = 10)**
ANSWER ALL THE QUESTIONS

1. State the major phases of OR.
2. Define Simplex method.
3. Define Assignment problem.
4. Explain job sequencing problem.
5. Define activity of a project network.

SECTION – B **(5 X 6 = 30)**
ANSWER ANY FIVE QUESTIONS

6. Write a note on Simulation model.
7. A television manufacturer is concerned about how many units of three types of portable television sets should be produced during the next time period to maximize profit. Based on past demands, a minimum of 200, 250 and 100 units of types I, II and III, respectively, are required. In addition the manufacturer has available a maximum of 1000 units of time and 2000 units of raw materials during the next time period. Data is given below. Note that 1.5 units of raw materials and 1.2 units of time are required to produce one television set of type II. Formulate as an LPP and solve using graphical method.

Type	Raw material	Time	Minimum requirement	Profit
I	1.0	2.0	200	10
II	1.5	1.2	250	14
III	4.0	1.0	100	12
available	2000	1000		

8. Solve the following transportation problem using Least cost method.

plant	Dealer					capacity
	1	2	3	4	5	
1	1.2	1.7	1.6	1.8	2.4	300
2	1.8	1.5	2.2	1.2	1.6	400
3	1.5	1.4	1.2	1.5	1.0	100
requirements	100	50	300	150	200	

9. Solve the following Assignment problem.

Task				
Employees	1	2	3	4
1	5	8	8	6
2	4	6	5	8
3	6	10	7	4
4	9	9	7	3

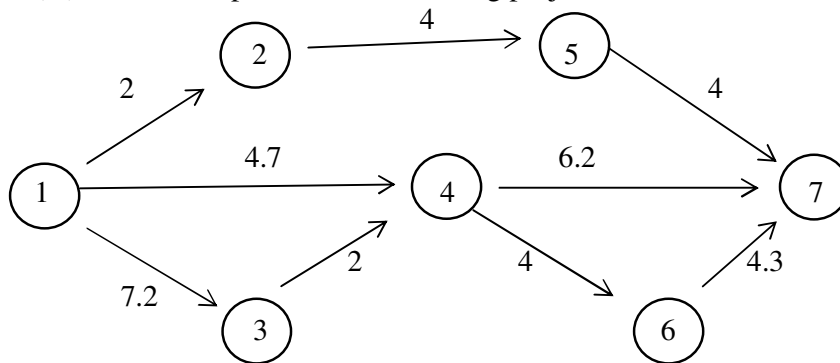
10. Solve the following assignment problem using branch and bound method till the first branch.

Job				
Person	1	2	3	4
A	2	10	9	7
B	15	4	14	8
C	13	14	16	11
D	4	15	13	9

11. Determine an optimal sequence to minimize the total elapsed time.

Job	Machine I	Machine II
1	2	4
2	6	3
3	7	8
4	10	11
5	4	5
6	9	1

12. Find (i) Earliest expected completion time for each event.
 (ii) Latest allowable completion time for each event
 (iii) The critical path, for the following project network.



SECTION – C
ANSWER ANY THREE QUESTIONS

(3 X 20 = 60)

13. a) Write a note on Mathematical model.
 b) Solve the following LPP by Simplex method.

$$\text{Maximize } z = 6x + 4y$$

$$\text{subject to } 2x + 3y \leq 100; 4x + 2y \leq 120; x, y \geq 0.$$

14. Solve the following assignment problem using Branch and Bound method.

Job				
Person	1	2	3	4
A	6	5	8	3
B	10	5	4	15
C	13	7	2	11
D	13	9	7	10

15. Solve the following Transportation problem using North-West corner rule and Vogel's method.

10	20	5	7	10
13	9	12	8	20
4	15	7	9	30
14	7	1	0	40
3	12	5	19	50
6	60	20	10	

16. Determine an optimal sequence to minimize the total elapsed time.

Job	Machine I	Machine II
1	20	4
2	10	12
3	3	5
4	10	8
5	5	6
6	2	12
7	8	4
8	7	10
9	3	6
10	4	1

17. Draw the project network for the following data.

Activities										
Estimates	1-2	1-3	1-4	2-5	3-4	3-6	4-5	4-7	5-7	6-7
a	2.20	1.51	5.00	6.00	2.00	5.51	1.76	4.00	5.00	2.51
m	2.45	6.12	9.90	7.50	5.00	10.21	4.06	8.16	10.38	5.62
b	6.00	10.00	15.39	12.00	8.00	14.00	6.00	11.35	13.49	11.00

- Find (i) Earliest expected completion time for each event.
(ii) Latest allowable completion time for each event
(iii) Slack time for each event
(iv) The critical path
(v) The probability of completing the events 5 and 7 on or before the scheduled completion time.

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